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NASA Procedural Requirements

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(NASA Only)

Subject: NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping w/Change 5 (03/15/2010)

Responsible Office: Office of Safety and Mission Assurance

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Appendix A. Terms and Definitions

Aircraft Mishap. An aircraft mishap is an occurrence associated with the operation of an aircraft, which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers a fatality or serious injury, or in which the aircraft receives substantial damage.

Appointing Official. The official authorized to appoint the investigating authority for a mishap or close call, to accept the investigation of another authority, to receive endorsements and comments from endorsing officials, and to approve the mishap report.

Barrier. A physical device intervention (e.g., a guardrail) or an administrative intervention that can provide procedural separation in time and space (i.e., lock-out/tag-out procedure) that is used to reduce risk of the undesired outcome to an acceptable level.

CAP Closure Statement. A final statement made by the appointing official that documents that all corrective actions have been completed and the CAP is closed.

Cause. An event or condition that results in an effect. Anything that shapes or influences the outcome.

Center Safety Office. The Center or Headquarters safety organization responsible for reporting and recording mishaps.

Chairperson. The individual in charge of a mishap investigation board or mishap

investigation team.

Close Call. An event in which there is no injury or only minor injury requiring first aid and/or no equipment/property damage or minor equipment/property damage (less than \$1000), but which possesses a potential to cause a mishap.

Cognizant Center Safety Office. The safety office of the Center that hosts the project or that has been assigned SMA responsibilities for the program.

Condition. Any as-found state, whether or not resulting from an event, that may have safety, health, quality, security, operational, or environmental implications.

Contributing Factor. An event or condition that may have contributed to the occurrence of an undesired outcome but, if eliminated or modified, would not by itself have prevented the occurrence.

Corrective Actions. Changes to design processes, work instructions, workmanship practices, training, inspections, tests, procedures, specifications, drawings, tools, equipment, facilities, resources, or material that result in preventing, minimizing, or limiting the potential for recurrence of a mishap.

Direct Cost of Mishap or Close Call (for the purpose of mishap classification). The sum of the costs (the greater value of actual or fair market value) of damaged property, destroyed property, or mission failure, actual cost of repair or replacement, labor (actual value of replacement or repair hours for internal and external/contracted labor), cost of the lost commodity (e.g., the cost of the fluid that was lost from a ruptured pressure vessel), as well as resultant costs such as environmental decontamination, property cleanup, and restoration, or the estimate of these costs.

Endorsing Official. The Appointing Official, Chief/OSMA, OCE, AMD, CHMO, Procurement, or other official who reviews the signed mishap report and provides a signed written endorsement, comments (when applicable), and a recommendation as to whether the mishap report shall be approved or rejected.

Event. A real-time occurrence describing one discrete action, typically an error, failure, or malfunction. Examples: pipe broke, power lost, lightning struck, and person opened valve.

Event and Causal Factor Tree. A graphic representation of the mishap or close call that shows the event (accident) at the top of the tree, depicts the logical sequence of events, illustrates all causal factor(s) (including condition[s] and failed barrier[s]) necessary and sufficient for the mishap or close call occurrence, and depicts the root cause(s) at the bottom of the tree.

Executive Summary. A very top-level summary of the circumstances of a mishap that includes who, what, when, where, and why, including a description of the proximate cause(s) and root cause(s).

Ex Officio. An individual authorized to participate in all investigation proceedings and tasked to assure that the investigation is conducted in conformance with NASA policy and this NPR.

Finding. A conclusion, positive or negative, based on facts established during the investigation by the investigating authority (i.e., cause, contributing factor, and observation).

First Aid. Refer to OSHA definition in 29 CFR 1904.7.

Final Mishap Investigation Report. The signed mishap investigation report with the endorsements and comments attached.

First Responder. An individual who in the early stages of an incident is responsible for the protection and preservation of life, property, evidence, and the environment, including emergency response providers as defined in section 2 of the Homeland Security Act of 2002 (6 U.S.C. 101), as well as emergency management, public health, clinical care, public works, and other skilled support personnel (such as equipment operators) that provide immediate support services during prevention, response, and recovery operations.

Flight Hardware. Any hardware that is flown on or is a part of an aircraft, experimental flight vehicle, satellite, lighter than air vehicles, unoccupied aerial vehicle, or space transportation system.

Flight Software. Any software that is flown on or is a part of an aircraft, experimental flight vehicle, satellite, lighter than air vehicles, unoccupied aerial vehicle, or space transportation system.

High Visibility (Mishaps or Close Calls). Those particular mishaps or close calls, regardless of the amount of property damage or personnel injury, that the Administrator, Chief/OSMA, CD, ED/OHO, or the Center SMA director judges to possess a high degree of programmatic impact or public, media, or political interest including, but not limited to, mishaps and close calls that impact flight hardware, flight software, or completion of critical mission milestones.

Hull Loss. An aircraft damaged to the extent that it is not economically feasible to repair it. This includes aircraft that are destroyed and aircraft that are missing.

Human Factors Mishap Investigator. An investigator with expertise in human factors engineering and mishap causation who has the primary responsibility to assist in the collection and analysis of data, determine how human factors caused or contributed to the mishap or close call, evaluate relevant human error and determine its root cause(s), and generate recommendations that eliminate or reduce the occurrence of the error or minimize the negative effects of the error to prevent the recurrence of the mishap.

Incident. An occurrence of a mishap or close call.

Interim Response Team. A team that arrives at the mishap scene immediately after an incident; secures the scene; documents the scene using photography, video, sketches, and debris mapping; identifies witnesses; collects written witness statements and contact information; preserves evidence; impounds evidence (at the scene and other NASA locations as needed); collects debris; implements the chain-of-custody process for the personal effects of the injured and deceased; notifies the NASA Public Affairs Officer about casualties, damages, and any potential hazards to the public and NASA personnel; advises the supervisor if drug testing should be initiated; and provides all information and evidence to the investigating authority. The team is considered "interim" because it operates as a short-term response team and concludes its mishap-response activities when the official NASA-appointed investigating authority arrives to the scene and takes control.

Intermediate Cause. An event or condition that existed before the proximate cause, directly resulted in its occurrence and, if eliminated or modified, would have prevented

the proximate cause from occurring.

Investigating Authority. The individual mishap investigator, mishap investigation team, or mishap investigation board authorized to conduct an investigation for NASA. This includes the mishap investigation board chairperson, voting members, and ex officio but does not include the advisors and consultants.

Lessons Learned. The written description of knowledge or understanding that is gained by experience, whether positive (such as a successful test or mission), or negative (such as a mishap or failure).

Lost Time Injury/Illness. A nonfatal traumatic injury that causes any loss of time from work beyond the day or shift it occurred; or a nonfatal nontraumatic illness/disease that causes disability at any time.

Mishap Investigation Board (MIB). A NASA-sponsored board that:

- a. Is appointed for a Type A mishap, Type B mishap, high-visibility mishap, or high-visibility close call.
- b. Requires concurrence from the Chief/OSMA and the Chief Engineer on membership.
- c. Consists of an odd number of Federal employees (including the chairperson) where the majority of the members are independent from the operation or activity in which the mishap occurred.
- d. Has a minimum of five voting members for Type A mishaps and three voting members for Type B mishaps.
- e. Includes a safety officer and a human factors mishap investigator. For all Type A mishaps involving injury, illness, or fatality, also includes an occupational health physician (or flight surgeon for aircraft-related mishaps) as a member.
- f. Is tasked to investigate the mishap or close call and generate the mishap report per the requirements specified in this NPR.

Mishap Investigation Team (MIT). A NASA-sponsored team that:

- a. Is appointed by the CD or ED/OHO, or designee, for a Type C mishap, Type D mishap, or close call.
- b. Does not require concurrence from the Chief/OSMA or the Chief Engineer on team membership.
- c. Consists of an odd number of Federal employees (including the chairperson) where the majority of the members are independent from the operation or activity in which the mishap occurred. (The actual number of members is chosen at the discretion of the appointing official.)
- d. Includes a safety officer and a human factors mishap investigator as members.
- e. Is tasked to investigate the mishap or close call and generate the mishap report per the requirements specified in this NPR.

Mishap Investigator (MI). A Federal employee who has expertise and experience in mishap or close call investigation; has knowledge of human error analysis in mishaps; serves as the sole investigator for a Type C mishap, Type D mishap, or close call; and is tasked to investigate the mishap or close call and generate the mishap report per this

NPR.

Mishap Preparedness and Contingency Plans. Pre-approved documents outlining timely organizational activities and responsibilities that must be accomplished in response to emergency, catastrophic, or potential (but not likely) events encompassing injuries, loss of life, property damage, or mission failure.

Mission Failure. A mishap of whatever intrinsic severity that prevents the achievement of the mission's minimum success criteria or minimum mission objectives as described in the mission operations report or equivalent document.

Note: A mission failure applies only to a NASA program's mission, and not a test or ongoing institutional operation. If a program accomplishes all minimum success criteria but not "full mission objectives," it is not a mission failure (even though in some cases it may appropriately be classified and investigated as a close call).

NASA Contractor or Grantee Mishap or Close Call. Any mishap or close call that a NASA contractor/grantee is required to report or investigate due to the provisions of its contract.

NASA Mishap. An unplanned event that results in at least one of the following:

- a. Injury to non-NASA personnel, caused by NASA operations.
- b. Damage to public or private property (including foreign property), caused by NASA operations or NASA-funded development or research projects.
- c. Occupational injury or occupational illness to NASA personnel.
- d. NASA mission failure before the scheduled completion of the planned primary mission.
- e. Destruction of, or damage to, NASA property except for a malfunction or failure of component parts that are normally subject to fair wear and tear and have a fixed useful life that is less than the fixed useful life of the complete system or unit of equipment, provided that the following are true: 1) there was adequate preventative maintenance; and 2) the malfunction or failure was the only damage and the sole action is to replace or repair that component.

NASA Operation. Any activity or process that is under NASA direct control or includes major NASA involvement.

NTSB Serious Injury. Any injury resulting from an aircraft mishap in which any one or more of the following apply:

- a. Requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received.
- b. Results in a fracture of any bone (except simple fractures of fingers, toes, or nose).
- c. Causes severe hemorrhages or nerve, muscle, or tendon damage.
- d. Involves any internal organ.
- e. Involves second- or third-degree burns, or any burns affecting more than 5 percent of

the body surface.

Observation. A factor, event, or circumstance identified during the investigation that did not contribute to the mishap or close call, but, if left uncorrected, has the potential to cause a mishap or increase the severity of a mishap; or a factor, event, or circumstance that is positive and should be noted.

Organizational Factor. Any operational or management structural entity that exerts control over the system at any stage in its life cycle, including, but not limited to, the system's concept development, design, fabrication, test, maintenance, operation, and disposal. Examples: resource management (budget, staff, training); policy (content, implementation, verification); and management decisions.

OSHA Final Mishap Summary. A report (OSHA 301 Form: Injury and Illness Incident Report, or an equivalent form) provided in accordance with 29 CFR 1960.70 by NASA to the Office of Federal Agency Programs for each mishap involving an OSHA recordable incident.

Permanent Total Disability. Any nonfatal injury or occupational illness that, in the opinion of competent medical authority, permanently and totally incapacitates a person to the extent that he or she cannot follow any gainful occupation and results in a medical discharge or civilian equivalent.

Permanent Partial Disability. Any injury or occupational illness that does not result in a fatality or permanent total disability, but, in the opinion of competent medical authority, results in permanent impairment through loss of use of any part of the body, with the following exceptions: loss of teeth, loss of fingernails or toenails, loss of tip of fingers or tip of toe without bone involvement, inguinal hernia (if it is repaired), disfigurements, or sprains or strains that do not cause permanent limitation of motion.

Property Damage. Damage to any type of government or civilian property, including, but not limited to, flight hardware, flight software, facilities, ground support equipment, and test equipment.

Proximate Cause. The event(s) that occurred, including any condition(s) that existed immediately before the undesired outcome, directly resulted in its occurrence and, if eliminated or modified, would have prevented the undesired outcome. Also known as the direct cause(s).

Recommendation. An action developed by the investigating authority to correct the cause or a deficiency identified during the investigation.

Responsible Organization. The organization responsible for the activity, people, or operation/program where a mishap occurs or the lowest level of organization where corrective action shall be implemented.

Root Cause. An event or condition that is an organizational factor that existed before the intermediate cause and directly resulted in its occurrence (thus indirectly it caused or contributed to the proximate cause and subsequent undesired outcome) and; if eliminated or modified, would have prevented the intermediate cause from occurring, and the undesired outcome. Typically, multiple root causes contribute to an undesired outcome.

Root Cause Analysis. A structured evaluation method that identifies the root causes for an undesired outcome and the actions adequate to prevent recurrence. Root cause

analysis should continue until organizational factors have been identified or until data are exhausted.

Serious Workplace Hazard. A condition, practice, method, operation, or process that has a substantial probability that death or serious physical harm could result and the employer did not know of its existence or did not exercise reasonable diligence to control the presence of the hazard.

Substantial Damage. Damage or failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowlings, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered "substantial damage" for the purpose of this part (from 49 CFR Part 830).

Type A Mishap. A mishap resulting in one or more of the following: (1) an occupational injury or illness resulting in a fatality, a permanent total disability, or the hospitalization for inpatient care of 3 or more people within 30 workdays of the mishap; (2) a total direct cost of mission failure and property damage of \$2 million or more; (3) a crewed aircraft hull loss; (4) an occurrence of an unexpected crewed aircraft departure from controlled flight (except high performance jet/test aircraft such as F-15, F-16, F/A-18, T-38, OV-10, and T-34, when engaged in flight test activities).

Type B Mishap. A mishap that caused an occupational injury or illness that resulted in a permanent partial disability, the hospitalization for inpatient care of 1-2 people within 30 workdays of the mishap, or a total direct cost of mission failure and property damage of at least \$500,000 but less than \$2,000,000.

Type C Mishap. A mishap resulting in a nonfatal occupational injury or illness that caused any days away from work, restricted duty, or transfer to another job beyond the day or shift on which it occurred, or a total direct cost of mission failure and property damage of at least \$50,000 but less than \$500,000.

Type D Mishap. A mishap that caused any nonfatal OSHA recordable occupational injury and/or illness that does not meet the definition of a Type C mishap, or a total direct cost of mission failure and property damage of at least \$1,000 but less than \$50,000.

Witness. A person who has information, evidence, or proof about a mishap and provides his/her knowledge of the facts to the investigating authority.

Witness Statements. A verbal or written statement from a witness that describes his/her account including a description of the sequence of events, facts, conditions, and/or causes of the mishap.

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